

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	("6225139").PN.	US-PGPUB; USPAT	OR	OFF	2005/08/01 09:51
L2	1	("20040085609").PN.	US-PGPUB; USPAT	OR	OFF	2005/08/01 09:53
L3	817	(@ad<"20021029") and (((lens or transparent or optical) and (encapsulant or epoxy or elastic or encapsulate or polymer)) with (cut or cutter or mill or milling))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:25
L4	313	L3 and (laser or photodiode or optoelectronic or optoelectronic or diode or (light near (emitter or emitting)))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:36
L5	313	L3 and (laser or photodiode or optoelectronic or optoelectronic or diode or (light near (emitter or emitting)))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:05
L6	63	L5 and (concave or convex)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:06
L7	2699	(@ad<"20021029") and (((lens or transparent or optical) and (encapsulant or epoxy or plastic or encapsulate or polymer)) with (cut or cutter or mill or milling))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:05
L8	729	L7 and (laser or photodiode or optoelectronic or optoelectronic or diode or (light near (emitter or emitting)))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:25
L9	182	L8 and (concave or convex)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:21
L10	0	("20030002272").PN.	USPAT	OR	OFF	2005/08/01 10:21
L11	1	("20030002272").PN.	US-PGPUB; USPAT	OR	OFF	2005/08/01 10:21

L12	150	(@ad<"20021029") and (((lens or transparent or optical) and (encapsulant or epoxy or plastic or encapsulate or polymer)) with (mill or milling))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:35
L13	50	L12 and (transducer or laser or photodiode or optoelectronic or optoelectronic or diode or (light near (emitter or emitting)))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:27
L14	0	L13 not L12	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:27
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L16	41	L15 not L9	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:38
L17	0	(Moc65/\$.cccls. and @ad<"20021029") and (mill or milling)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:36
L18	0	(Moc.65/\$.cccls. and @ad<"20021029") and (mill or milling)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:36
L19	628	("65"/\$.cccls. and @ad<"20021029") and (mill or milling)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:36

L20	138	L19 and (transducer or laser or photodiode or optoelectronic or optoelectronic or diode or (light near (emitter or emitting)))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:37
L21	138	L20 not L16	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:38
L22	138	L20 not L12	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:38

US-PAT-NO: 6717738

DOCUMENT-IDENTIFIER: US 6717738 B2

\*\*See image for Certificate of Correction\*\*

TITLE: Optical element, metal mold for producing optical element and production method for optical element

----- KWIC -----

Application Filing Date - AD (1):  
20020603

Brief Summary Text - BSTX (7):

In a data storage apparatus such as a magneto-optic disk apparatus or DVD (digital versatile disk) apparatus an optical head is arranged close to the surface of a disk-like data recording medium and a converged laser beam is exposed onto a data recording media surface to record data on data recording medium or read data from the data recording medium.

Brief Summary Text - BSTX (8):

When trying to raise a recording density of data in order to achieve a larger capacity of data recording in such a data storage apparatus, the laser beam must be sharply converged and exposed on the surface of the data recording medium, and it is necessary to use an object lens having a high numerical aperture (NA). In this case, if a large sized lens is used, the optical head ends up becoming large, then, a diameter of the lens must be kept at a small size. Accordingly, this means usage of a lens having a high numerical aperture and having a small size. As a result, it becomes necessary to arrange the lens extremely close to the surface of the data recording medium.

Brief Summary Text - BSTX (12):

Next, as shown in FIG. 19D, in order to form two floating use rails 2108 and 2108 at the two end portions of the bottom surface of the slider substrate 2102, two grooves 2110 and 2110 sandwiching the ball lens 2106 is formed by for example dry etching such as ion milling or RIE (reactive ion etching) and selective etching utilizing semiconductor photolithography.

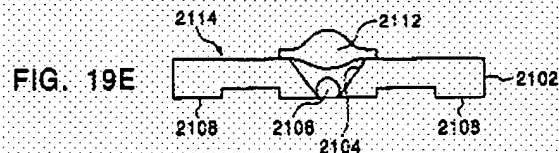
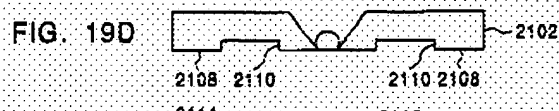
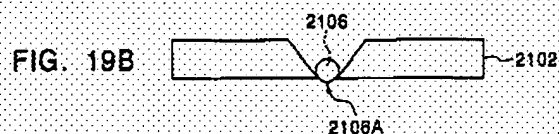
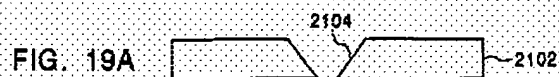
Brief Summary Text - BSTX (17):

Further, when forming a floating type optical head by using the above optical element, in order to record data on the data recording medium at a high density and reproduce data recorded at a high density from the data recording medium, it is necessary to sharply converge the laser beam and expose the converged beam on a specific position on the data recording medium with a good precision. Accordingly, when forming the conventional floating type optical head 2114, an extremely high precision is required particularly in the work for formation and assembly of the lens, the work took a long time, skill was necessary. Also, it was necessary to form the parts used with a very high precision too.

Detailed Description Text - DETX (13):

Note that the optical element 100 is suitable for a floating type optical head arranged close to the surface of a disk-like data recording medium and focusing a converged laser beam on the surface of a

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L5	313	L3 and (laser or photodiode or optoelectronic or optoelectronic or diode or (light near (emitter or emitting)))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:05
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L10	0	("20030002272").PN.	USPAT	OR	OFF	2005/08/01 10:21
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L14	0	L13 not L12	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:27
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L16	41	L15 not L9	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:38
L17	0	(Moc65/\$.ccls. and @ad<"20021029") and (mill or milling)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:36
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L19	628	("65"/\$.ccls. and @ad<"20021029") and (mill or milling)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:36

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L21	138	L20 not L16	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:38
L22	138	L20 not L12	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 10:38
L23	1	("20030002272").PN.	US-PGPUB; USPAT	OR	OFF	2005/08/01 11:08
L24	1712	(@ad<"20021029") and (((lens or transparent or optical) and (encapsulant or epoxy or plastic or encapsulate or polymer)) with (grind or grinding or rotational or rotation or drill or drilling))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 11:20
L25	594	L24 and (transducer or laser or photodiode or optoelectronic or optoelectronic or diode or (light near (emitter or emitting)))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 11:24
L26	3	L24 and 257/79,98,116-118,294. ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 11:30
L27	0	L24 and 438/112,116.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/08/01 11:30